



SEQUENCE LISTING

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TECH CENTER 1600/2900

<110> DOANS, Diana M.  
Gralnick, Jeff A.

<120> Method for Preventing Superoxide Damage to Cells and  
Oxygen-Labile Proteins

<130> 960296.97559

<140> 09/955,502

<141> 2001-09-18

<150> 60/234,588

<151> 2000-09-22

<160> 33

<170> PatentIn Ver. 2.1

<210> 1

<211> 65

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:YggX consensus  
sequence

<220>

<221> UNSURE

<222> (2)

<223> can be any amino acid

<220>

<221> UNSURE

<222> (4)..(6)

<223> can be any amino acid

<220>

<221> UNSURE

<222> (8)..(22)

<223> can be any amino acid

<220>

<221> UNSURE

<222> (24)..(26)

<223> can be any amino acid

<220>  
<221> UNSURE  
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<223> can be any amino acid

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<221> UNSURE  
<222> (40)..(41)  
<223> can be any amino acid

<220>  
<221> UNSURE  
<222> (43)..(45)  
<223> can be any amino acid

<220>  
<221> UNSURE  
<222> (48)  
<223> can be any amino acid

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<222> (50)  
<223> can be any amino acid

<220>  
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<222> (53)..(54)  
<223> can be any amino acid

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<222> (56)..(62)  
<223> can be any amino acid

<220>  
<221> UNSURE  
<222> (64)..(65)  
<223> can be any amino acid

<400> 1  
Met Xaa Arg Xaa Xaa Xaa Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa  
1 5 10 15  
Xaa Xaa Xaa Xaa Xaa Xaa Pro Xaa Xaa Xaa Gly Xaa Xaa Xaa Xaa Xaa  
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Trp Xaa Xaa Trp Xaa Xaa Xaa Gln Thr Xaa  
 35 40 45

Leu Xaa Asn Glu Xaa Xaa Leu Xaa Xaa Xaa Xaa Xaa Xaa Arg Xaa  
 50 55 60

Xaa  
 65

<210> 2  
 <211> 87  
 <212> PRT  
 <213> Bordetella pertussis

<400> 2  
 Met Ser Arg Ile Val Asn Cys Val Lys Leu Lys Arg Glu Ala Glu Gly  
 1 5 10 15

Leu Asp Phe Pro Pro Tyr Pro Gly Glu Leu Gly Thr Arg Ile Trp Gln  
 20 25 30

Gln Ile Ser Lys Glu Ala Trp Glu Glu Trp Lys Gln Ile Gln Thr Arg  
 35 40 45

Leu Val Asn Glu Asn Arg Leu Asn Leu Ala Asp Ala Arg Ala Arg Lys  
 50 55 60

Tyr Leu Gln Gln Gln Met Glu Arg Phe Leu Phe Glu Asp Gly Thr Val  
 65 70 75 80

Glu Ala Gln Gly Tyr Val Pro  
 85

<210> 3  
 <211> 87  
 <212> PRT  
 <213> Bordetella parapertussis

<400> 3  
 Met Ser Arg Ile Val Asn Cys Val Lys Leu Lys Arg Glu Ala Glu Gly  
 1 5 10 15

Leu Asp Phe Pro Pro Tyr Pro Gly Glu Leu Gly Thr Arg Ile Trp Gln  
 20 25 30

Gln Ile Ser Lys Glu Ala Trp Glu Glu Trp Lys Gln Ile Gln Thr Arg

35                      40                      45  
 Leu Val Asn Glu Asn Arg Leu Asn Leu Ala Asp Ala Arg Ala Arg Lys  
     50                      55                      60  
 Tyr Leu Gln Gln Gln Met Glu Arg Phe Leu Phe Glu Asp Gly Thr Val  
     65                      70                      75                      80  
 Glu Ala Gln Gly Tyr Val Pro  
                                  85

<210> 4  
 <211> 86  
 <212> PRT  
 <213> Bordetella bronchiseptica

<400> 4  
 Met Ser Arg Ile Val Asn Cys Val Lys Leu Lys Arg Glu Ala Glu Gly  
     1                      5                      10                      15  
 Leu Asp Phe Pro Pro Tyr Pro Gly Glu Leu Gly Thr Arg Ile Trp Gln  
                                  20                      25                      30  
 Gln Ile Ser Lys Glu Ala Trp Glu Glu Trp Lys Gln Ile Gln Thr Arg  
                                  35                      40                      45  
 Leu Val Asn Glu Asn Arg Leu Asn Leu Ala Asp Ala Arg Ala Arg Lys  
     50                      55                      60  
 Tyr Leu Gln Gln Gln Met Glu Arg Phe Leu Phe Glu Asp Gly Thr Val  
     65                      70                      75                      80  
 Glu Ala Gln Gly Val Pro  
                                  85

<210> 5  
 <211> 91  
 <212> PRT  
 <213> Actinobacillus actinomycetemcomitans

<400> 5  
 Met Ala Arg Met Val Phe Cys Glu Arg Leu Lys Gln Glu Ala Glu Gly  
     1                      5                      10                      15  
 Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asp  
                                  20                      25                      30

Ser Ile Ser Lys Gln Ala Trp Gly Glu Trp Met Lys Lys Gln Thr Met  
 35 40 45

Leu Val Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
 50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Asp Val  
 65 70 75 80

His Ile Glu Gly Tyr Thr Pro Pro Glu Ala Lys  
 85 90

<210> 6

<211> 87

<212> PRT

<213> Pasteurella multocida

<400> 6

Met Ala Arg Thr Val Phe Cys Glu Tyr Leu Lys Gln Glu Ser Glu Gly  
 1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asp  
 20 25 30

Ser Ile Ser Lys Gln Ala Trp Arg Glu Trp Met Lys Lys Gln Thr Met  
 35 40 45

Leu Val Asn Glu Lys Lys Leu Asn Met Met Asn Ala Asp His Arg Gln  
 50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Asp Val  
 65 70 75 80

His Ile Glu Gly Tyr Val Pro  
 85

<210> 7

<211> 87

<212> PRT

<213> Haemophilus influenzae

<400> 7

Met Ala Arg Thr Val Phe Cys Glu Tyr Leu Lys Lys Glu Ala Glu Gly  
 1 5 10 15

Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asp  
                   20                                  25                                  30  
 Ser Val Ser Lys Gln Ala Trp Gly Glu Trp Ile Lys Lys Gln Thr Met  
                   35                                  40                                  45  
 Leu Val Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
                   50                                  55                                  60  
 Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Asp Val  
                   65                                  70                                  75                                  80  
 His Ile Glu Gly Tyr Val Pro  
                                   85

<210> 8  
 <211> 87  
 <212> PRT  
 <213> Haemophilus ducreyi

<400> 8  
 Met Ala Arg Met Val Phe Cys Glu Tyr Leu Lys Lys Glu Ala Glu Gly  
                   1                                  5                                  10                                  15  
 Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asn  
                   20                                  25                                  30  
 Ser Ile Ser Lys Gln Ala Trp Ala Glu Trp Ile Lys Lys Gln Thr Met  
                   35                                  40                                  45  
 Leu Val Asn Glu Lys Lys Leu Asn Met Met Asn Pro Glu His Arg Gln  
                   50                                  55                                  60  
 Leu Leu Glu Ala Glu Met Val Asn Phe Leu Phe Glu Gly Lys Asp Val  
                   65                                  70                                  75                                  80  
 His Ile Asp Gly Tyr Val Pro  
                                   85

<210> 9  
 <211> 88  
 <212> PRT  
 <213> Shewanella putrefasciens

<400> 9  
 Met Ala Arg Thr Val Asn Cys Val His Leu Asn Lys Glu Ala Asp Gly

1                      5                      10                      15  
 Leu Asp Phe Gln Leu Tyr Pro Gly Asp Leu Gly Lys Arg Ile Phe Asp  
                          20                      25                      30  
 Asn Ile Ser Lys Glu Ala Trp Gly Leu Trp Gln Lys Lys Gln Thr Met  
                          35                      40                      45  
 Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Val Asp Asp Arg Lys  
                          50                      55                      60  
 Phe Leu Glu Ala Gln Met Thr Ser Phe Leu Phe Glu Gly Lys Asp Val  
                          65                      70                      75                      80  
 Glu Ile Glu Gly Phe Val Pro Glu  
    85

<210> 10  
 <211> 90  
 <212> PRT  
 <213> Vibrio cholerae

<400> 10  
 Met Ala Arg Thr Val Phe Cys Thr Arg Leu Gln Lys Glu Ala Asp Gly  
                          1                      5                      10                      15  
 Leu Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Phe Asp  
                          20                      25                      30  
 Asn Ile Cys Lys Glu Ala Trp Ala Gln Trp Gln Thr Lys Gln Thr Met  
                          35                      40                      45  
 Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asp Pro Glu His Arg Lys  
                          50                      55                      60  
 Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Glu Val  
                          65                      70                      75                      80  
 His Ile Glu Gly Tyr Thr Pro Pro Ala Lys  
    85                      90

<210> 11  
 <211> 91  
 <212> PRT  
 <213> Escherichia coli K-12 MG1655

<400> 11

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Gln Arg Glu Ala Glu Gly  
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn  
20 25 30

Glu Ile Ser Lys Glu Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met  
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Glu Val  
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys  
85 90

<210> 12

<211> 91

<212> PRT

<213> Escherichia coli O157:H7EDL933

<400> 12

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Gln Arg Glu Ala Glu Gly  
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn  
20 25 30

Glu Ile Ser Lys Glu Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met  
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Glu Val  
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys  
85 90

<210> 13

<211> 91

<212> PRT



<213> Escherichia coli O157:H7

<400> 13

Met Ser Arg Thr Ile Phe Cys Thr Phe Leu Gln Arg Glu Ala Glu Gly  
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn  
20 25 30

Glu Ile Ser Lys Glu Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met  
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
50 55 60

Leu Leu Glu Gln Glu Met Val Asn Phe Leu Phe Glu Gly Lys Glu Val  
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys  
85 90

<210> 14

<211> 91

<212> PRT

<213> Salmonella paratyphi

<400> 14

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly  
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn  
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met  
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val  
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys  
85 90

<210> 15

<211> 88  
<212> PRT  
<213> Salmonella enteritidis

<400> 15

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly  
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn  
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met  
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val  
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu  
85

<210> 16  
<211> 91  
<212> PRT  
<213> Salmonella dublin

<400> 16

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly  
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn  
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met  
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val  
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys  
85 90

<210> 17  
<211> 91  
<212> PRT  
<213> Salmonella typhi CT18

<400> 17

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly  
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn  
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met  
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val  
65 70 75 80

His Ile Glu Gly Tyr Thr Pro Glu Asp Lys Lys  
85 90

<210> 18

<211> 91

<212> PRT

<213> Salmonella typhimurium

<400> 18

Met Ser Arg Thr Ile Phe Cys Thr Tyr Leu Gln Arg Asp Ala Glu Gly  
1 5 10 15

Gln Asp Phe Gln Leu Tyr Pro Gly Glu Leu Gly Lys Arg Ile Tyr Asn  
20 25 30

Glu Ile Ser Lys Asp Ala Trp Ala Gln Trp Gln His Lys Gln Thr Met  
35 40 45

Leu Ile Asn Glu Lys Lys Leu Asn Met Met Asn Ala Glu His Arg Lys  
50 55 60

Leu Leu Glu Gln Glu Met Val Ser Phe Leu Phe Glu Gly Lys Asp Val  
65 70 75 80

His Ile Glu Gly Tyr Pro Thr Glu Asp Lys Lys

&lt;210&gt; 19

&lt;211&gt; 78

&lt;212&gt; PRT

<213> *Klebsiella pneumoniae*

&lt;400&gt; 19

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ser | Arg | Thr | Ile | Phe | Cys | Thr | Phe | Leu | Gln | Arg | Glu | Ala | Asp | Gly |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gln | Asp | Phe | Gln | Leu | Tyr | Pro | Gly | Glu | Leu | Gly | Lys | Arg | Ile | Tyr | Asn |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     |     | 30  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Glu | Ile | Ser | Lys | Glu | Ala | Trp | Ala | Gln | Trp | Gln | His | Lys | Gln | Thr | Met |
|     |     |     | 35  |     |     |     | 40  |     |     |     |     | 45  |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Ile | Asn | Glu | Lys | Lys | Leu | Ser | Met | Met | Asn | Pro | Glu | His | Arg | Lys |
|     |     | 50  |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Leu | Glu | Gln | Glu | Met | Val | Gln | Phe | Leu | Phe | Glu | Gly | Lys |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |

&lt;210&gt; 20

&lt;211&gt; 90

&lt;212&gt; PRT

<213> *Yersinia pestis*

&lt;400&gt; 20

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ser | Arg | Thr | Ile | Phe | Cys | Thr | Phe | Leu | Lys | Lys | Asp | Ala | Glu | Arg |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gln | Asp | Phe | Gln | Leu | Tyr | Pro | Gly | Glu | Ile | Gly | Lys | Arg | Ile | Tyr | Asn |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     |     | 30  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Glu | Ile | Ser | Lys | Glu | Ala | Trp | Ser | Gln | Trp | Ile | Thr | Lys | Gln | Thr | Met |
|     |     |     | 35  |     |     |     | 40  |     |     |     |     | 45  |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Ile | Asn | Glu | Lys | Lys | Leu | Ser | Met | Met | Asn | Ile | Glu | Asp | Arg | Lys |
|     |     | 50  |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Leu | Glu | Gln | Glu | Met | Val | Asn | Phe | Leu | Phe | Glu | Gly | Gln | Asp | Val |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |

|     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| His | Ile | Ala | Gly | Tyr | Thr | Pro | Pro | Ser | Lys |
|     |     |     |     | 85  |     |     |     |     | 90  |

<210> 21  
 <211> 76  
 <212> PRT  
 <213> Buchnera sp. APS

<400> 21  
 Met Asn Arg Ile Ile Phe Cys Thr Phe Phe Lys Lys Lys Ser Glu Gly  
     1                    5                    10                    15  
  
 Gln Asp Phe Gln Ser Tyr Pro Gly Lys Leu Gly Lys Lys Ile Tyr Asp  
                     20                    25                    30  
  
 Gln Ile Ser Lys Lys Ala Trp Glu Lys Trp Ile Glu Lys Gln Thr Ile  
                     35                    40                    45  
  
 Leu Ile Asn Glu Glu Asn Leu Asn Met Phe Asn Leu Glu His Arg Lys  
                     50                    55                    60  
  
 Lys Ile Glu Lys Tyr Met Lys Leu Phe Leu Phe Lys  
     65                    70                    75

<210> 22  
 <211> 89  
 <212> PRT  
 <213> Xylella fastidiosa

<400> 22  
 Met Gln Arg Ile Ile Phe Cys Glu Tyr Glu Gln Arg Asp Thr Glu Gly  
     1                    5                    10                    15  
  
 Leu Asp Phe Val Pro Tyr Pro Gly Glu Leu Gly Gln Lys Ile Phe Ala  
                     20                    25                    30  
  
 Cys Ile Gly Lys Val Gly Trp Ala Ala Trp Leu Val His Gln Thr Met  
                     35                    40                    45  
  
 Leu Ile Asn Glu Asn Arg Leu Ser Pro Arg Asn Pro Ser His Arg Ala  
                     50                    55                    60  
  
 Phe Leu Glu Glu Glu Leu Asn Lys Phe Leu Phe Glu Arg Arg Val Ala  
     65                    70                    75                    80  
  
 Lys Pro Glu Gly Tyr Ile Glu Pro Asp  
                     85

<210> 23  
 <211> 90  
 <212> PRT  
 <213> Pseudomonas syringae

<400> 23  
 Met Thr Arg Thr Val Met Cys Arg Lys Tyr Lys Glu Glu Leu Pro Gly  
           1                          5                          10                          15  
 Leu Glu Arg Ala Pro Tyr Pro Gly Ala Lys Gly Glu Asp Ile Phe Asn  
                           20                          25                          30  
 His Val Ser Gln Lys Ala Trp Ala Asp Trp Gln Lys His Gln Thr Leu  
                           35                          40                          45  
 Leu Ile Asn Glu Arg Arg Leu Asn Met Met Asn Ala Glu Asp Arg Lys  
           50                          55                          60  
 Phe Leu Gln Thr Glu Met Asp Lys Phe Leu Ser Gly Glu Glu Tyr Ala  
           65                          70                          75                          80  
 Gln Ala Glu Gly Tyr Val Pro Pro Glu Lys  
                           85                          90

<210> 24  
 <211> 87  
 <212> PRT  
 <213> Pseudomonas putida

<400> 24  
 Met Thr Arg Thr Val Met Cys Arg Lys Tyr Gln Glu Glu Leu Pro Gly  
           1                          5                          10                          15  
 Leu Glu Arg Pro Pro Tyr Pro Gly Ala Lys Gly Gln Asp Ile Phe Glu  
                           20                          25                          30  
 His Ile Ser Gln Lys Ala Trp Ala Asp Trp Gln Lys His Gln Thr Met  
                           35                          40                          45  
 Leu Ile Asn Glu Lys Arg Leu Asn Met Met Asn Ala Glu Asp Arg Lys  
           50                          55                          60  
 Phe Leu Gln Ala Glu Met Asp Lys Phe Phe Ala Gly Glu Glu Tyr Ala  
           65                          70                          75                          80  
 Gln Ala Glu Gly Tyr Val Pro

&lt;210&gt; 25

&lt;211&gt; 87

&lt;212&gt; PRT

<213> *Pseudomonas aeruginosa*

&lt;400&gt; 25

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ser | Arg | Thr | Val | Met | Cys | Arg | Lys | Tyr | His | Glu | Glu | Leu | Pro | Gly |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Asp | Arg | Pro | Pro | Tyr | Pro | Gly | Ala | Lys | Gly | Glu | Asp | Ile | Tyr | Asn |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     |     | 30  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Val | Ser | Arg | Lys | Ala | Trp | Asp | Glu | Trp | Gln | Lys | His | Gln | Thr | Met |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Ile | Asn | Glu | Arg | Arg | Leu | Asn | Met | Met | Asn | Ala | Glu | Asp | Arg | Lys |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Phe | Leu | Gln | Gln | Glu | Met | Asp | Lys | Phe | Leu | Ser | Gly | Glu | Asp | Tyr | Ala |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |

|     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|
| Lys | Ala | Asp | Gly | Tyr | Val | Pro |
|     |     |     |     |     | 85  |     |

&lt;210&gt; 26

&lt;211&gt; 88

&lt;212&gt; PRT

<213> *Neisseria gonorrhoeae*

&lt;400&gt; 26

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Arg | Met | Val | Phe | Cys | Val | Lys | Leu | Asn | Lys | Glu | Ala | Glu | Gly |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Lys | Phe | Pro | Pro | Leu | Pro | Asn | Glu | Leu | Gly | Lys | Arg | Ile | Phe | Glu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     |     | 30  |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Val | Ser | Gln | Glu | Ala | Trp | Ala | Ala | Trp | Thr | Arg | His | Gln | Thr | Met |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Leu | Ile | Asn | Glu | Asn | Arg | Leu | Ser | Leu | Ala | Asp | Pro | Arg | Ala | Arg | Glu |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Tyr | Leu | Ala | Gln | Gln | Met | Glu | Gln | Tyr | Phe | Phe | Gly | Asp | Gly | Ala | Asp |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |

AZ CONT.

Ala Val Gln Gly Tyr Val Pro Gln  
85

<210> 27

<211> 88

<212> PRT

<213> Neisseria meningitidis B

<400> 27

Met Ala Arg Met Val Phe Cys Val Lys Leu Asn Lys Glu Ala Glu Gly  
1 5 10 15

Met Lys Phe Pro Pro Leu Pro Asn Glu Leu Gly Lys Arg Ile Phe Glu  
20 25 30

Asn Val Ser Gln Glu Ala Trp Ala Ala Trp Thr Arg His Gln Thr Met  
35 40 45

Leu Ile Asn Glu Asn Arg Leu Ser Leu Ala Asp Pro Arg Ala Arg Glu  
50 55 60

Tyr Leu Ala Gln Gln Met Glu Gln Tyr Phe Phe Gly Asp Gly Ala Asp  
65 70 75 80

Ala Val Gln Gly Tyr Val Pro Gln  
85

<210> 28

<211> 88

<212> PRT

<213> Neisseria meningitidis A

<400> 28

Met Ala Arg Met Val Phe Cys Val Lys Leu Asn Lys Glu Ala Glu Gly  
1 5 10 15

Met Lys Phe Pro Pro Leu Pro Asn Glu Leu Gly Lys Arg Ile Phe Glu  
20 25 30

Asn Val Ser Gln Glu Ala Trp Ala Ala Trp Thr Arg His Gln Thr Met  
35 40 45

Leu Ile Asn Glu Asn Arg Leu Ser Leu Ala Asp Pro Arg Ala Arg Glu  
50 55 60



Tyr Leu Ala Gln Gln Met Glu Gln Tyr Phe Phe Gly Asp Gly Ala Asp  
65 70 75 80

Ala Val Gln Gly Tyr Val Pro Gln  
85

<210> 29

<211> 87

<212> PRT

<213> Burkholderia mallei

<400> 29

Met Ala Arg Met Ile His Cys Ala Lys Leu Gly Lys Glu Ala Glu Gly  
1 5 10 15

Leu Asp Phe Pro Pro Leu Pro Gly Glu Leu Gly Lys Arg Leu Tyr Glu  
20 25 30

Ser Val Ser Lys Gln Ala Trp Gln Asp Trp Leu Lys Gln Gln Thr Met  
35 40 45

Leu Ile Asn Glu Asn Arg Leu Asn Met Ala Asp Pro Arg Ala Arg Gln  
50 55 60

Tyr Leu Met Lys Gln Thr Glu Lys Tyr Phe Phe Gly Glu Gly Ala Asp  
65 70 75 80

Gln Ala Ser Gly Tyr Val Pro  
85

<210> 30

<211> 87

<212> PRT

<213> Burkholderia pseudomallei

<400> 30

Met Ala Arg Met Ile His Cys Ala Lys Leu Gly Lys Glu Ala Glu Gly  
1 5 10 15

Leu Asp Phe Pro Pro Leu Pro Gly Glu Leu Gly Lys Arg Leu Tyr Glu  
20 25 30

Ser Val Ser Lys Gln Ala Trp Gln Asp Trp Leu Lys Gln Gln Thr Met  
35 40 45

Leu Ile Asn Glu Asn Arg Leu Asn Met Ala Asp Pro Arg Ala Arg Gln

50

55

60

Tyr Leu Met Lys Gln Thr Glu Lys Tyr Phe Phe Gly Glu Gly Ala Asp  
 65 70 75 80

Gln Ala Ser Gly Tyr Val Pro  
 85

&lt;210&gt; 31

&lt;211&gt; 87

&lt;212&gt; PRT

<213> *Thiobacillus ferrooxidans*

&lt;400&gt; 31

Met Ser Arg Met Val Gln Cys Val Lys Leu Gly His Glu Ala Glu Gly  
 1 5 10 15

Leu Asp Arg Pro Pro Tyr Pro Gly Ala Leu Gly Ala Arg Ile Tyr Gln  
 20 25 30

Glu Val Ser Lys Glu Ala Trp Gln Gly Trp Leu Lys His Gln Thr Met  
 35 40 45

Leu Ile Asn Glu Tyr Arg Leu Ser Pro Ile Asp Pro Lys Ser Arg Thr  
 50 55 60

Phe Leu Glu Lys Gln Met Glu Ala Tyr Phe Phe Gly Asp Gly Ala Gln  
 65 70 75 80

Ser Pro Glu Gly Tyr Val Pro  
 85

&lt;210&gt; 32

&lt;211&gt; 87

&lt;212&gt; PRT

<213> *Methylococcus capsulatus*

&lt;400&gt; 32

Met Ala Arg Arg Ile Ile Cys Ala Lys Leu Gly Ile Glu Ala Asp Gly  
 1 5 10 15

Leu Asp Ala Pro Pro Phe Pro Gly Pro Gln Gly Gln Arg Ile Phe Glu  
 20 25 30

His Val Ser Lys Glu Ala Trp Gln Asp Trp Leu Lys Leu Gln Thr Met  
 35 40 45

Leu Ile Asn Glu His Arg Leu Thr Pro Phe Glu Ala Ser Ala Arg Lys  
50 55 60

Phe Leu Glu Gln Glu Arg Glu Lys Phe Leu Phe Gly Gly Gly Thr Ser  
65 70 75 80

Thr Pro Gln Gly Tyr Val Pro  
85

<210> 33

<211> 88

<212> PRT

<213> Coxiella burnetii

<400> 33

Met Thr Arg Arg Ile Ile Cys Gln Lys Leu Gly Lys Glu Ala Asp Ala  
1 5 10 15

Leu Asn Tyr Ser Pro Tyr Pro Gly Glu Leu Gly Glu Arg Ile Tyr Asn  
20 25 30

His Ile Ser Glu Gln Ala Trp Gln Ala Trp Leu Ser His Gln Thr Met  
35 40 45

Leu Ile Asn Glu Tyr Arg Leu Ser Leu Ile Asp Pro Lys Ala Arg Gln  
50 55 60

Phe Leu Glu Gln Glu Met Ile Asn Phe Leu Phe Gly Thr Gly Ser Glu  
65 70 75 80

Lys Pro Ala Gly Tyr Thr Ser Glu  
85

2 conc'd.